APPENDIX D

to Consent Judgment in the matter of
United States v. Coltec Industries, Inc., et al.,
relating to the Liberty Industrial Finishing Superfund Site

CONCEPTUAL DESIGN DOCUMENT

[redacted]

001910_EN16_02-B1799

Conceptual Design for a Fish Ladder at Massapequa Lake Oyster Bay, Nassau County New York

May 2006

Prepared for:

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Table of Contents

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List of Figures

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List of Abbreviations and Acronyms

EEEPC	Ecology and Environment Engineering, P.C.
EIS	Environmental Impact Statement
FONSI	Finding of No Significant Impact
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NRD	Natural Resource Damage
NYSDEC	New York State Department of Environmental Conservation
PRP	Potential Responsible Party
SEQR	State Environmental Quality Review Act
USDOJ	United States Department of Justice
USFWS	United States Fish and Wildlife Service

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1 Introduction

On August 30, 2005, the National Oceanic and Atmospheric Association (NOAA) of the United States Department of Commerce, and the United States Fish and Wildlife Service (FWS) on behalf of the Department of the Interior, and in consultation with the New York State Department of Environmental Conservation (NYSDEC) (collectively, "the Trustees") prepared a Restoration Plan and Environmental Assessment (RPEA), along with a Finding of No Significant Impact under the National Environmental Policy Act. The RPEA concluded that the construction of a fish ladder would restore anadromous fish passage from the Massapequa Tidal Channel to the Massapequa Lake, resulting in access to approximately 40 acres of freshwater habitat. Nassau County has also proposed installation of fish ladders at Massapequa Lake in the Environmental Impact Statement (EIS) for the *Massapequa Preserve Streamflow Augmentation and Pond Restoration*, which was finalized in April 2004 under the New York State Environmental Quality Review Act (SEQR).

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2 Summary of Agreement in Consent Judgment

The Settling Defendants to the Liberty Industrial Finishing Site Natural Resource Damages Consent Judgment ("NRD CJ") will, through their contractors, design and install one Alaska steeppass fish ladder (or equivalent), a marine-grade aluminum structure through which target anadromous fish (blue-back herring [*Alosa aestivalis*] and alewife [*Alosa pseudoharengus*]) will be able to reach potential spawning areas in Massapequa Lake from the existing lake discharge channel. The fish ladder will be installed at the westernmost spillway at the southern end of Massapequa Lake. This fish ladder will be attached to an existing spillway that is the property of Nassau County. Given this attachment, the fish ladder will become Nassau County property. Pursuant to the NRD CJ, Settling Defendants shall pay a total of $131,500 to the Trustees to reimburse Past and Future Costs incurred and to be incurred by the Trustees in assessing damages to natural resources at the Site, overseeing and monitoring performance of the Restoration Project, and performance of operation, monitoring and maintenance of the Restoration Project once construction is complete.

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3 Description of Existing Site Conditions

Massapequa Lake is a 40-acre freshwater body located near the southern end of the Massapequa Preserve in the Town of Oyster Bay, Nassau County, New York (see Figure 1). The lake, a man-made impoundment fed by Massapequa Creek, is situated directly north of Merrick Road, a 5-lane highway. Two architectural stone and concrete dam structures, which discharge water from the lake, are located at the southern end of Massapequa Lake. The dams are stepped, with elevation changes of approximately 3 feet. The western spillway is curved and discharges into two box culverts beneath Merrick Road; the eastern spillway is rectangular and discharges into a single elliptical culvert. These discharges flow approximately one mile to South Oyster Bay and Long Island Sound via bulkheaded Lower Massapequa Creek.

The dams represent the upstream limit of tidal influence, which averages approximately 1.5 feet in amplitude near South Oyster Bay (NOAA, NYSDEC, USFWS 2005). The predicted maximum high tide and minimum low tide for 2005 were 1.9 feet and -0.4 foot, respectively, at the Biltmore Shores, South Oyster Bay gauging station (NOAA/NOS tide predictions Web site 2005).

Plan and section sketches of the western spillway dam are included on the attached drawings. Measurements of the dam were collected by Ecology and Environment Engineering, P.C. ("EEEPC") on November 16, 2005, and the dam was surveyed on December 30, 2005. (See Survey at the Massapequa Dam attached.) The arc-shaped dam is approximately 30 feet wide (see photo on Figure 2). The service spillway is approximately 8 feet wide. At the service spillway, the discharge falls approximately 3 feet to a concrete bench. The bench slopes gently for approximately 18 feet until reaching a lip that drops vertically another 2.5 feet. The Merrick Road bridge, which consists of two box culverts, is approximately 26.5 feet from the centerline of the service spillway (see photo on Figure 2).

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\\BUFNT4\GIS\Buffalo\NRD_Fish\Maps\MXD\Fish Passage Project Area.mxd 12/01/2006

Source: NYS GIS Clearinghouse 2000

Figure 1
Fish Passage Project Area
Massapequa Lake, Oyster Bay
Nassau County, New York

0 0.125 0.25 0.5 Miles

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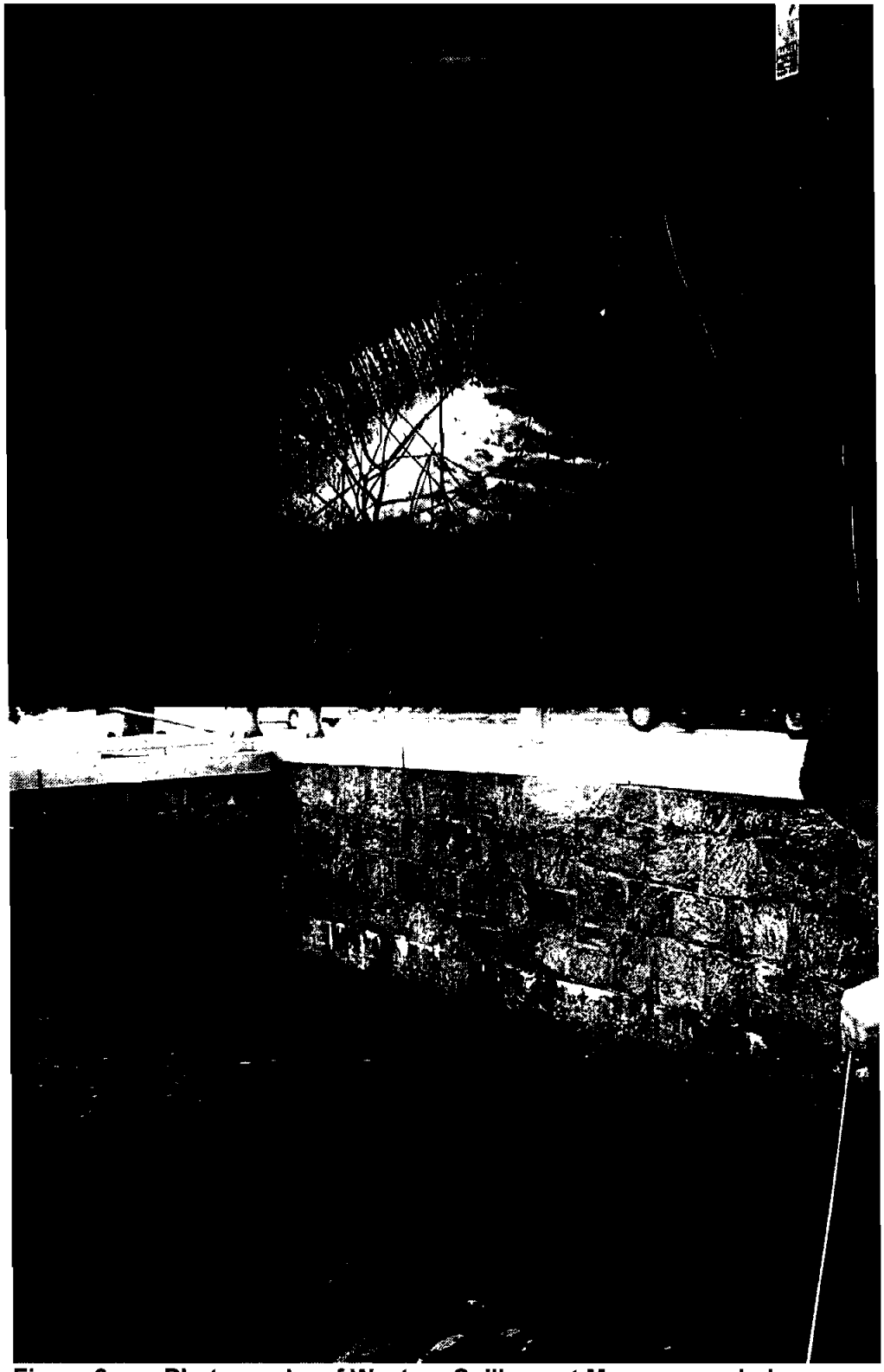

Figure 2 **Photographs of Western Spillway at Massapequa Lake and Box Culverts at Merrick Road Bridge**

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4 Design Considerations

Although fish ladders are not a new technology, universally accepted design guidelines are not available. EEEPC conducted a review of scientific literature and fishway guidelines to develop the basis of design for the Massapequa Lake site. The following design parameters were reviewed: target species/seasonal use, fish ladder slope, depth of water, jumping heights, and other considerations.

4.1 Target Species/Seasonal Use

Two fish—the blueback herring and the alewife—have been identified as target species. The blueback herring is an anadromous species that moves into larger streams to spawn. Blueback herring average 10 to 12 inches in length, and have a maximum length of approximately 15 inches (Smith 1985). The body depth is relatively slender; a 13.5-inch herring is about 3 inches deep (Bigelow and Schroeder 1953).

The blueback herring is known to travel farther inland than other river herrings (Smith 1985), and it tends to spawn in flowing water conditions. They have been documented to travel upstream through locks in the Hudson River and Mohawk River drainage areas. The spawning runs occur in springtime, beginning in mid- to late April when water temperatures reach 39° to 48° Fahrenheit (F), and spawning begins when temperatures reached 57°F (Loesch and Lund 1977).

The alewife also is an anadromous species that spawns in large rivers and streams. Alewives are very difficult to distinguish from blueback herring, barring an internal body examination; alewives are somewhat larger, although there is much overlap in the size of the two species. Alewives attain a maximum length of approximately 15 inches (Smith 1985). The body depth of an alewife is greater than that of a blueback herring, with a 13.5-inch alewife having an approximately 4-inch body depth (Bigelow and Schroeder 1953).

Alewives tend to spawn in slack water conditions. Spawning runs in the Hudson River occur in March and April (Smith 1985). When found in the same river system, alewives tend to spawn 3 to 4 weeks earlier than blueback herring. Alewives begin spawning in Massachusetts streams when water temperatures reach 51°F (Bigelow and Schroeder 1953).

Based on available information regarding the spawning preferences of the target species, the Massapequa fish ladder will be designed to provide passage for adult blueback herring and alewives to reach spawning grounds in the spring of each year, approximately March and April. For juvenile out-migration in the fall, it is assumed that as flows spill over the dam, juvenile herring and alewife would successfully migrate out of the Massapequa Lake system. The proposed fish ladder would also be available for use during the out-migration.

4.2 Fish Ladder Slope

Alaskan steeppass ladders are designed to provide passage for fish in conditions with steep (25% to 35%) slopes (OTA 1995). The Washington State Department of Fish and Wildlife indicates that Alaskan steeppass ladders are typically designed to provide fish passage at about 25% slope (WDFW 2000). Therefore, the basis of design for the Massapequa Lake fish ladder will be a maximum slope of 25%.

4.3 Depth of Water

Based on an approximately 3-inch body depth for the blueback herring and an approximately 4-inch body depth for the alewife (Bigelow and Schroeder 1953), it is assumed that a minimum of 6 inches of water must flow through the fish ladder during March and April, when the ladder is to provide spawning adults access to Massapequa Lake.

4.4 Other Considerations

The basis of design for the fish entrance invert (i.e., bottom of the fish ladder) will be below the average low-tide line, if possible.

The following additional design considerations were made for the dam and the bridge:

- The fish ladder will be designed so as to not interfere with the service spillway of the dam (i.e., notching and/or attachment will take place at the auxiliary spillway);
- Construction within the box culverts will be avoided; and
- The water level in the lake is assumed to continue to be maintained at or near its current level.

The parties to the NRD CJ believe that this fish ladder is consistent with Nassau County's goals for restoration of the Massapequa Preserve as indicated in the EIS for the *Massapequa Preserve Streamflow Augmentation and Pond Restoration*. It should be noted that construction of a single fish ladder does not guarantee the successful return of the target fish to Massapequa Lake. Success will depend on providing adequate access (to be provided via fish ladders such as the one dis-

cussed herein) and improvements to habitat (as proposed by Nassau County in the EIS).

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5 Proposed Plan

The conceptual design of the fish ladder is shown on Sheet 2 of the drawings. The top of the ladder will be placed approximately one foot from the eastern edge of the service spillway. In order to provide adequate water for the fish ladder, the dam will be notched to a depth of approximately 1.5 feet and a width of 2 feet. The fish ladder will be mounted to the dam with an angle adapter in accordance with the manufacturer's details. A removable coarse bar rack will be mounted at the upstream end of the fishway to exclude larger pieces of trash and debris.

The fish ladder will descend from the notched dam to approximately 6 feet beyond the bench lip. The fish ladder entrance invert will be below the average low-tide line, if possible. An entrance channel will be added to the downstream end of the steeppass sections. The entrance channel will have stoplog slots for flow control and to provide an attraction jet. The ladder will be fastened to the bench just upstream of the bench lip. Stoplogs or blocks may be needed at the downstream edge of the bench to avoid having river herring pass the entrance and be dead-ended at the base of the spillway. The total length of the fish ladder will be approximately 22 feet, and the ladder will not extend inside the box culverts. In the conceptual design shown on Sheet 2, the fish ladder slope is 9%, well below the design basis maximum of 25%.

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6 Next Steps and Schedule

Pursuant to the NRD CJ, not later than 30 days after the CJ is entered, the Settling Defendants will submit a final design to the Trustees for review and approval. This final design will include, but not be limited to, final drawings, based on surveyor measurements, specifications for the installation, and an updated design report.

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7 Permit Requirements

Modification of the dam will require approval and permits from NYSDEC's Dam Safety and Environmental Permits Offices.

A permit from Nassau County also will be necessary for work within the Massapequa Preserve. As this project is considered an improvement to the Massapequa Preserve ecosystem, it is anticipated the necessary permit(s) for temporary work or permanent installations and monitoring will be issued.

The Stage IA Archaeological Survey completed as part of the Massapequa Preserve EIS process did not indicate any potential concerns over installing a fish ladder on the Massapequa Lake dam.

The New York State Department of State has reviewed the project for consistency with the Coastal Zone Management Act.

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8 References

Bigelow and Schroeder. 1953. *Fishes of Gulf of Maine*. First Revision. Fishery Bulletin 74. Fishery Bulletin of the Fish and Wildlife, Volume 53. Washington, D.C.

Loesch, J.G. and W.A. Lund. 1977. A contribution to the life history of the blueback herring, *Alosa aestivalis*, *Transactions of the American Fisheries Society*. 106(6): 583-589.

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Smith, C.L. 1985. *The Inland Fishes of New York State*. New York State Department of Environmental Conservation. Albany, New York.

Washington State Department of Fish and Wildlife (WDFW). 2000. Draft *Fishway Guidelines for Washington State*. Washington Department of Fish and Wildlife. Olympia, Washington, April 25, 2000.

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A Construction Size Drawings

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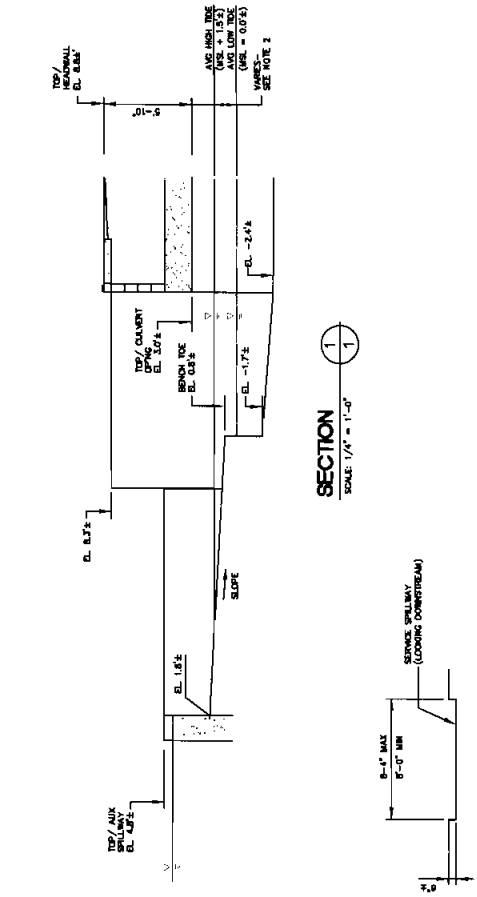

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SECTION
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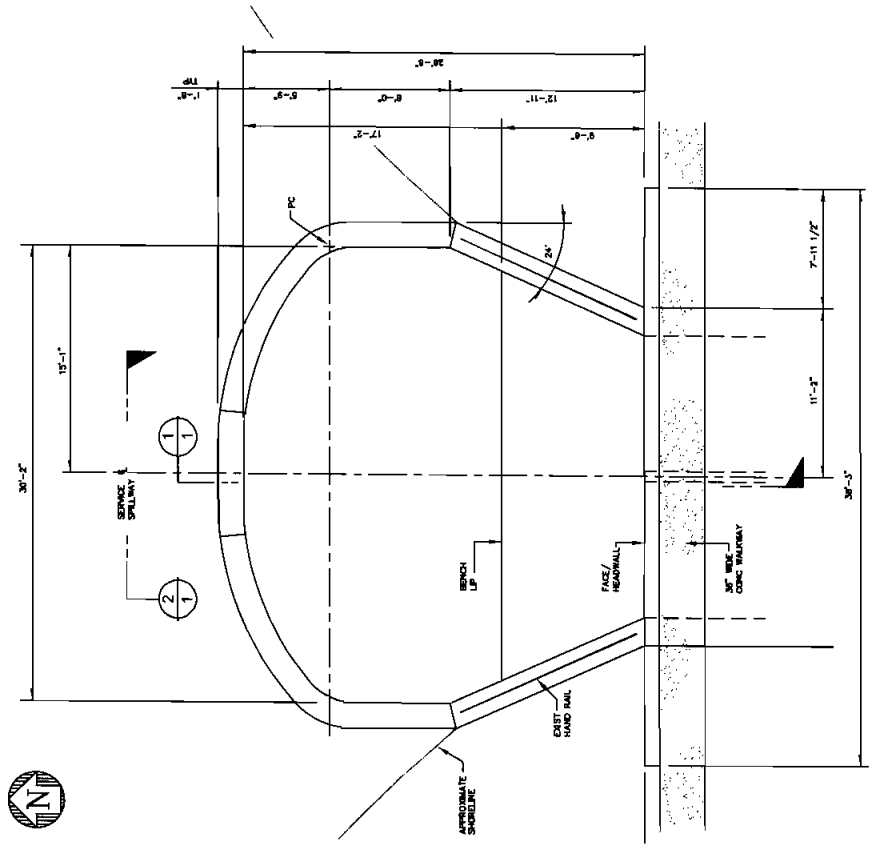

DAM PLAN - EXISTING
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. ALL DIMENSIONAL INFORMATION SHOWN ON THIS DRAWING IS BASED ON FIELD INFORMATION AND MUST BE VERIFIED PRIOR TO COMMENCEMENT OF WORK AT THIS INSTALLATION.
2. HIGH TIDE = > 1.5' ABOVE MEAN SEA LEVEL (TYP-AMD).

DRAFT
DO NOT USE FOR CONSTRUCTION
BHE NO CAD DEPT MARK

LIBERTY PRP GROUP
MARIANNA LAKE — MARSHALL COUNTY — NEW YORK

FISH LADDER
EXISTING DAM - PLAN AND SECTION

SCALE: AS NOTED | DATE ISSUED: 11/18/05 | C.A.D. FILE NO.: fishladd.dwg | DRAWING NO.: Sheet - 1 of 2 | REV: A

ecology and environment engineering, p.c.

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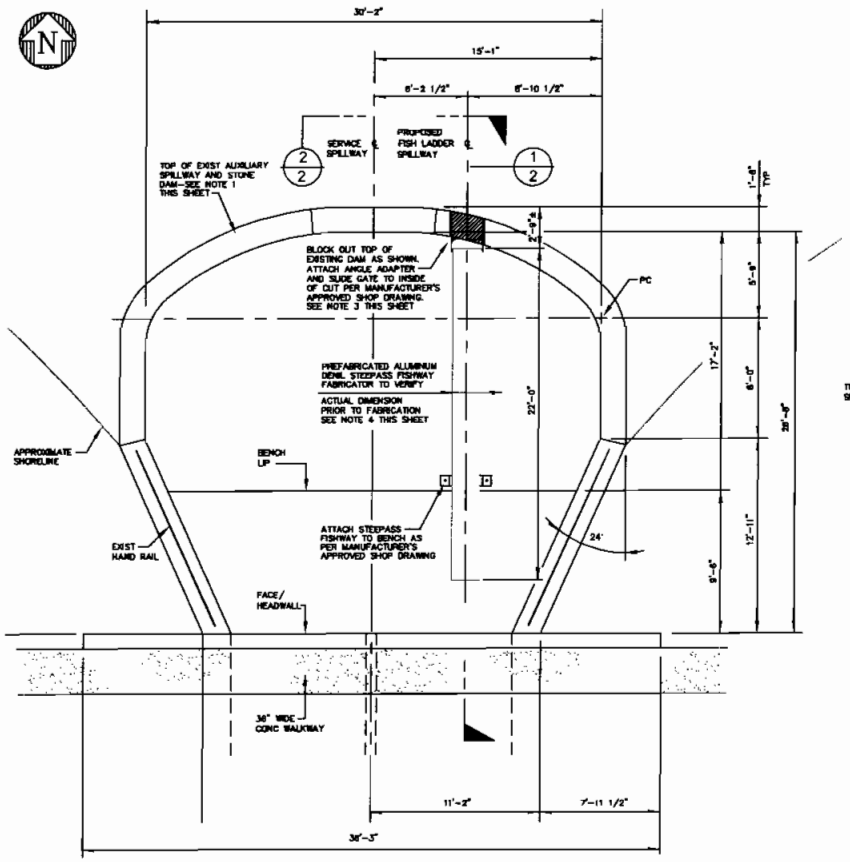
DESIGNED BY: M MORGANTE P.E. | CHECKED BY: DP ALBERS P.E.
DRAWN BY: J.I. SCHULER | APPROVED BY: DJ MILLER P.E.

REFERENCE DRAWINGS

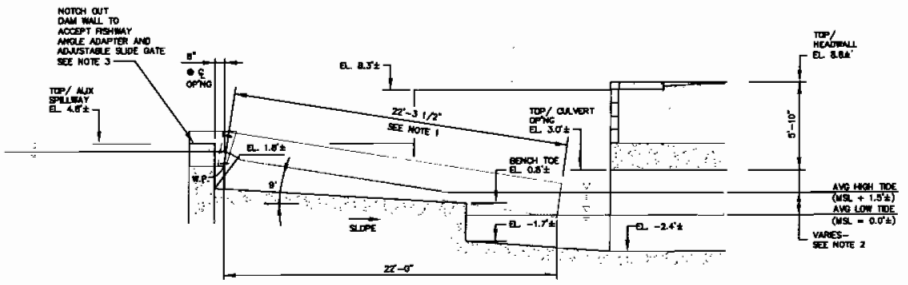


FISH LADDER INSTALLATION PLAN

SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. ALL DIMENSIONAL INFORMATION SHOWN ON THIS DRAWING IS BASED ON FIELD INFORMATION AND MUST BE VERIFIED PRIOR TO COMMENCEMENT OF WORK AT THIS INSTALLATION.
2. ACTUAL DEPTH OF FISH LADDER SPILLWAY TO BE VERIFIED BY THE TRUSTEES.
3. FABRICATOR SHALL MODIFY SLIDE GATE IN ANGLE ADAPTER TO MATCH ACTUAL ELEVATION OF AUXILIARY SPILLWAY ELEVATION AT POINT OF CONNECTION.
4. THROAT DIMENSION SHOWN IS FOR LAYOUT PURPOSES ONLY. ACTUAL LADDER DIMENSIONS TO BE DETERMINED BY MANUFACTURER PRIOR TO FABRICATION.
5. TYPICAL AVERAGE HIGH TIDE IS 1.5 FEET ABOVE MSL, AS MEASURED AT THE BILTMORE SHORES/OYSTER BAY NOAA STATION.



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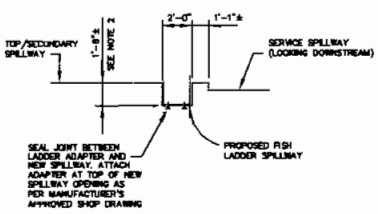

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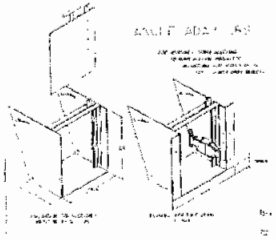

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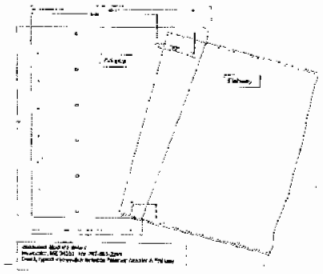

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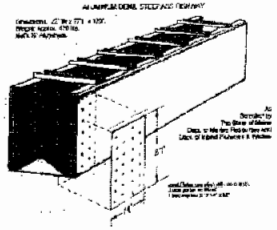

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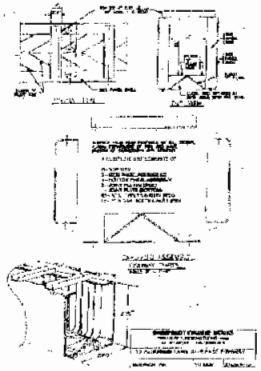

FISH LADDER DETAILS

NOT TO SCALE

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REFERENCE DRAWINGS

ecology and environment engineering, p.c.

DESIGNED BY	CHECKED BY
M MORGANTE P.E.	DP ALBERS P.E.
DRAWN BY	APPROVED BY
JJ KOHLER	DJ MILLER P.E.

LIBERTY PRP GROUP

MASSAPEQUA LAKE — NASSAU COUNTY — NEW YORK

FISH LADDER INSTALLATION PLAN, SECTIONS AND DETAILS

SCALE	DATE ISSUED	C.A.D. FILE NO.	DRAWING NO.	REV.
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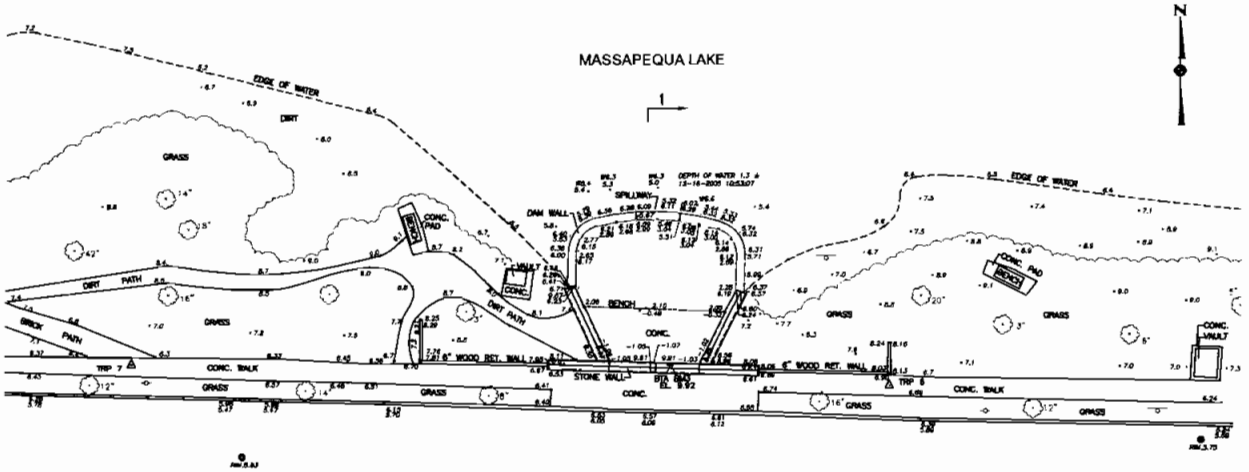
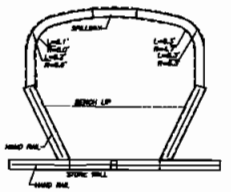
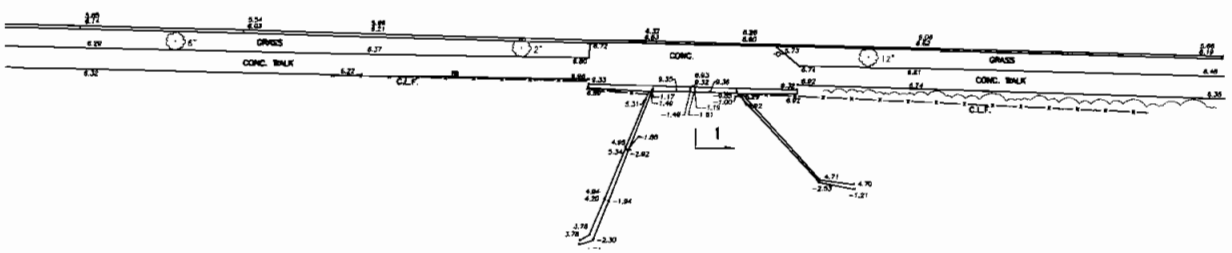
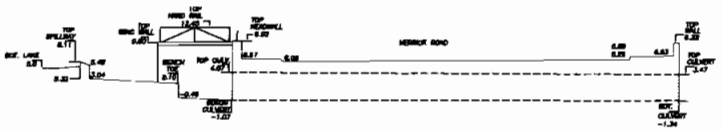




DAM GEOMETRY

MERRICK ROAD





CENTER LINE PROFILE 1-1

NOTES

1. FIELD WORK DONE BY D.T.P.M. & M.N.U.E. ON DECEMBER, 2005

2. ALL ELEVATIONS SHOWN REFER TO THE NORTH AMERICAN VERTICAL DATUM NAVD 88

-BM 21U00 TBM3, EL. 8.709 U.S.C.&G.S. DISC STAMPED "B M 3-1927" SET IN CONC. WITH TITLE FORM IN TOP OF EMBANKMENT AROUND MASSAPEQUA STATE PARK 70' NORTH OF CENT. LINE MERRICK RD 120' EAST OF CENTER LINE OCEAN AVE.

-BM 21V99 6162AX, EL. 8.731 SQ. CUT ON WEST CURB OF BILTMORE BLVD., 84' SOUTH OF CENTER LINE OF MERRICK ROAD

-STA RMJ FI 3.97 SQ. CUT SET OVER EASTERLY CULVERT ON NORTH SIDE OF BRIDGE AT DAM MASSAPEQUA LAKE

3. COORDINATES SHOWN ARE BASED ON NAD 83 NEW YORK LONG ISLAND ZONE, US SURVEY FOOT

REFERENCE POINTS - NASSAU COUNTY GIS GPS MONUMENTS

POINT	NORTH (M)	EAST (M)	NORTH (F)	EAST (F)
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1M08MAZ	59686.181	343965.036	195681.263	1128557.572
17P08N	59684.867	345619.589	195677.100	1133916.987
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SYMBOL LEGEND

- SIGN
- TREE
- UTILITY POLE
- DRAIN MANHOLE
- TRAFFIC BOX
- BENCH MARK

ECOLOGY & ENVIRONMENT ENGINEERING, P.C.

LIBERTY INDUSTRIAL FINISHING SITE

FARMINGDALE, NY NASSAU COUNTY